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10/665,334

09/18/2003

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EXAMINER

JAWORSKI, FRANCIS J

ART UNIT

PAPER NUMBER

3768

MAIL DATE

DELIVERY MODE

10/29/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/665,334

Applicant(s)

BARNES, STEPHEN R.

Examiner

Jaworski Francis J.

Art Unit

3768

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-23 is/are allowed.
- 6) ☒ Claim(s) 1, 3-9, 24, 25 and 27 is/are rejected.
- 7) ☒ Claim(s) 2, 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3 as amended are rejected under 35 U.S.C. 102(b) as being anticipated by Aindow (US6094988) which teaches a receive device having an ultrasound array for converting received acoustic signals to electrical energy when used principally as a receiver (or alternatively as a medical imaging transmitter/receiver per col. 2 lines 48 – 56) , and where the array having a piezomember 8 with case ground 6 and discrete electrodes 2 is backed by an anechoic layer 4. That is to say, backing layer 4 is chosen to be a backing block material having both insulative and acoustically absorptive properties as described in col. 1 line 58 – col. 2 line 3 col. 3 lines 5 – 13. [Note that while the Aindow disclosure refers to 4 as a 'layer' not a 'surface', the layer presents a defined surface towards the transducer array across which the received

echo does not back-reflect and therefore an anechoic surface is appurtenant to this anechoic layer.]

Claims 1, 3, 5 – 9 and 27 as amended are again rejected under 35 U.S.C. 102(b) as being anticipated by Miller et al(US5267221) in that Miller teaches apparatus and method exemplarily in col. 6 lines 11 – 69 backing layer of impedance similar to the transducer such that no energy will eventually reflect back thereinto (and therefore the interface with the second acoustic layer of lower velocity which wicks the acoustic energy in anti-waveguide fashion being an ‘anechoic surface’, the combination of the first and second backing serving to absorb all reflective energy for the transducer array mounted to the backing block. The reference need not explicitly use the term ‘anechoic surface’ in order to functionally have an anechoic surface. Rather, the backing need only serve to provide a transmission – attenuation/absorption behaviour so as to be anechoic in effect, whereupon for such a layer the entry surface may be properly termed ‘anechoic’. A matched backing material of course has an acoustic impedance nearly the same as the array to which it is matched. Tungsten metal is included in the backing block material having the array and aluminum in the cladding as part of the overall backing mismatch.

Claims 4 – 5, 7 – 8 and 24 – 25 as amended are rejected under 35 U.S.C. 103(a) as being obvious over Aindow or Miller et al, in either case further in view of Bar-Cohen (US4698541), alone or further in view of Hazony et al. As argued above, both of the former pertain to a transducer material having an array of elements and a backing block where rearwardly propagated ultrasound enters via a general impedance

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match and is attenuatively absorbed such that no reflection emerges. It would have been obvious in view of the latter to have the transducer portion 12 backed by a composite two – part backing layer 14, 16 with the first part 14 comprised of a metal alloy and impedance-matched to the transducer and the second part 16 which is of a different composite and although matched to the first part is highly absorptive.

Therefore the second scattering surface of 14 which apposes 16 may be considered an anechoic surface since the acoustic energy crossing it is absorbed and does not return or reflect as an artifact echo. Again, since the interface is both angulated and roughened to deliberately create scattering, the composite effect is that of a Rayleigh dump or sink where energy is scattered and sunk into an absorptive terminus. The point here is not that Bar-Cohen is a single-transducer ultrasound application but that it teaches advantageous further modifications to permit energy passing into the backing to dissipate, by the particularization of a two-part backing with what amounts to a Rayleigh dump interface.

In the alternative, Hazony et al is added as in the prior Office action insofar as whereas the former may be argued to be deficient regarding whether the anechoic function occurs at the roughened surface and/or whether such a surface has sufficient roughness to constitute peaks and valleys, it would have been obvious in view of the latter's metallic element 20 and col. 3 lines 15 – 35 and col. 4 lines 25 – 44 to form regular peaks and valleys in the anechoic surface and to dissipate arriving acoustic waves by virtue of action at this surface.

Allowable Subject Matter

Claims 2 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 10 - 23 are allowed.

Response to Arguments

1) The rejection based on Strozeski et al has been withdrawn since the amendatory language precludes the interpretation that separate transducer assemblies 34 may constitute the array with respect to the anechoic backing block. However Aindow remains in conflict since anechoic properties associate with a unitary ultrasound transmit and receive array assembly backing block.

2) The rejection based upon Miller et al is sustained, and the Examiner's reasoning differs from the applicants on this point. The term anechoic derives from acoustics and sonar baffles where in the latter case for example the elimination of reflections are a desirable stealth function. Yet the device or material which provides the anechoic function need not be non-transmissive at its surface but rather prevent echoes e.g. by transmission and absorption. See Johansen US 3923118 col. 1 lines 18 – 22 as an example of term usage. Hence Miller et al in col. 6 are describing an anechoic backing that is either an impedance match or partial mismatch at its entry

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surface but does not allow an entering ultrasound wave to return-exit by virtue of its attenuation absorption. The point perhaps is that the term 'anechoic' does not have to literally be used to describe what is a functionally anechoic layer, and being such a layer the acoustic entry surface is an anechoic surface since no echo exits back from such surface.

3) The rejection of claims 2 and 21 – 23 using Friemel et al/Robinson as secondary teachings has been withdrawn and these claims are objected to/allowed since the Examiner is accepting applicant's arguments that the mere general suggestion of application equivalence of cMUT to piezoelectrics for certain circumstances is insufficient to carry forward to particular backing block adaptations.

4) Claims 10 – 16 are allowed since both Miller et al and Aindow for example as well as Bar-Cohen desire that the backing block be attenuative.

While non-attenuative backings are known such as in an alternative proposed in Lynnworth (US4297607) .

5) Claims 17 – 20 are allowed since inter alia the references fail to teach a backing block having greater thermal conductivity than the transducer piezomaterial and/or its electrodes.

Rolle (US3784805) is cited for annular array 16 of Fig. 3 having anechoic surface 45 on backing plate 41.

Denaro et al (US4450544) is directed inter alia to sonar array 170 encapsulated within anechoic diaphragm 172.

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Dione et al (US6878115) teaches housing a 3D computed tomography ultrasound array within an anechoic pc rubber backing chamber cylinder 12.

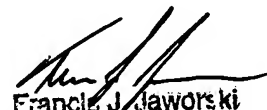
THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication should be directed to Jaworski Francis J. at telephone number 571-272-4738.

FJJ:fjj

102007


Francis J. Jaworski
Primary Examiner